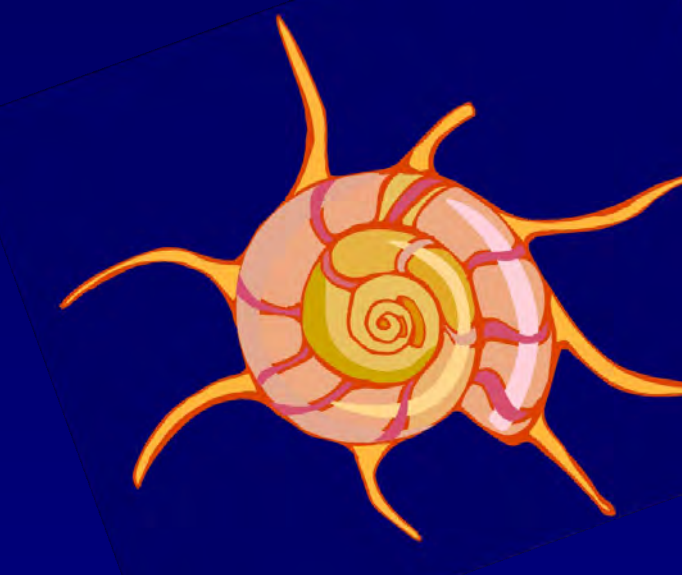




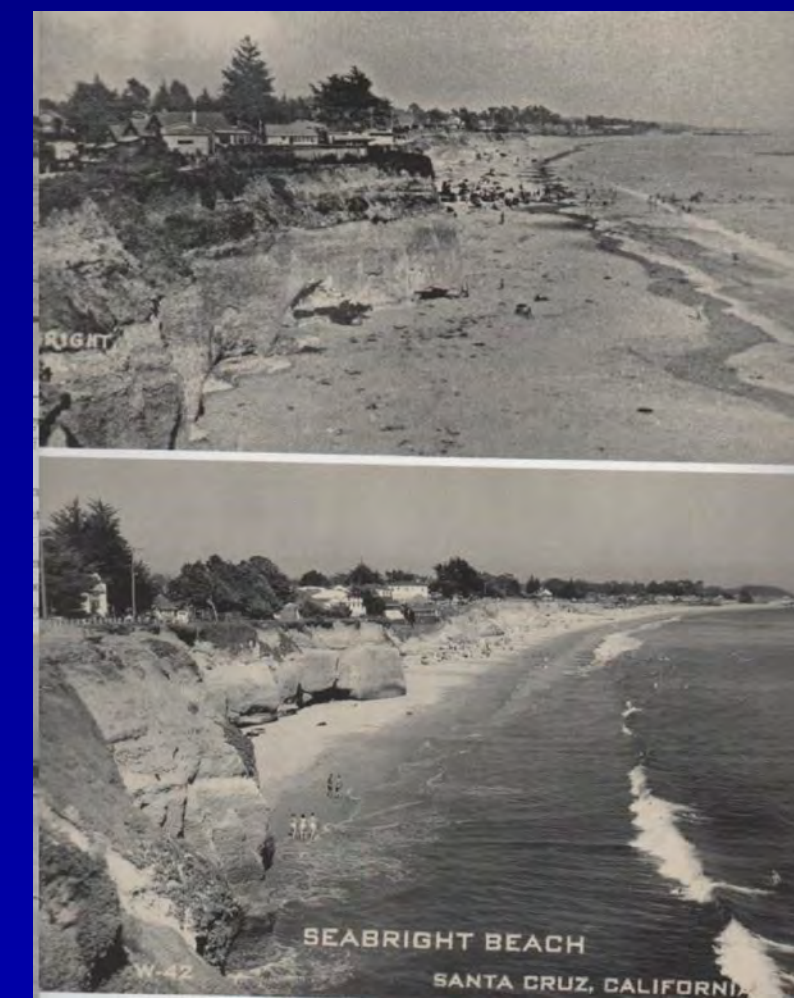
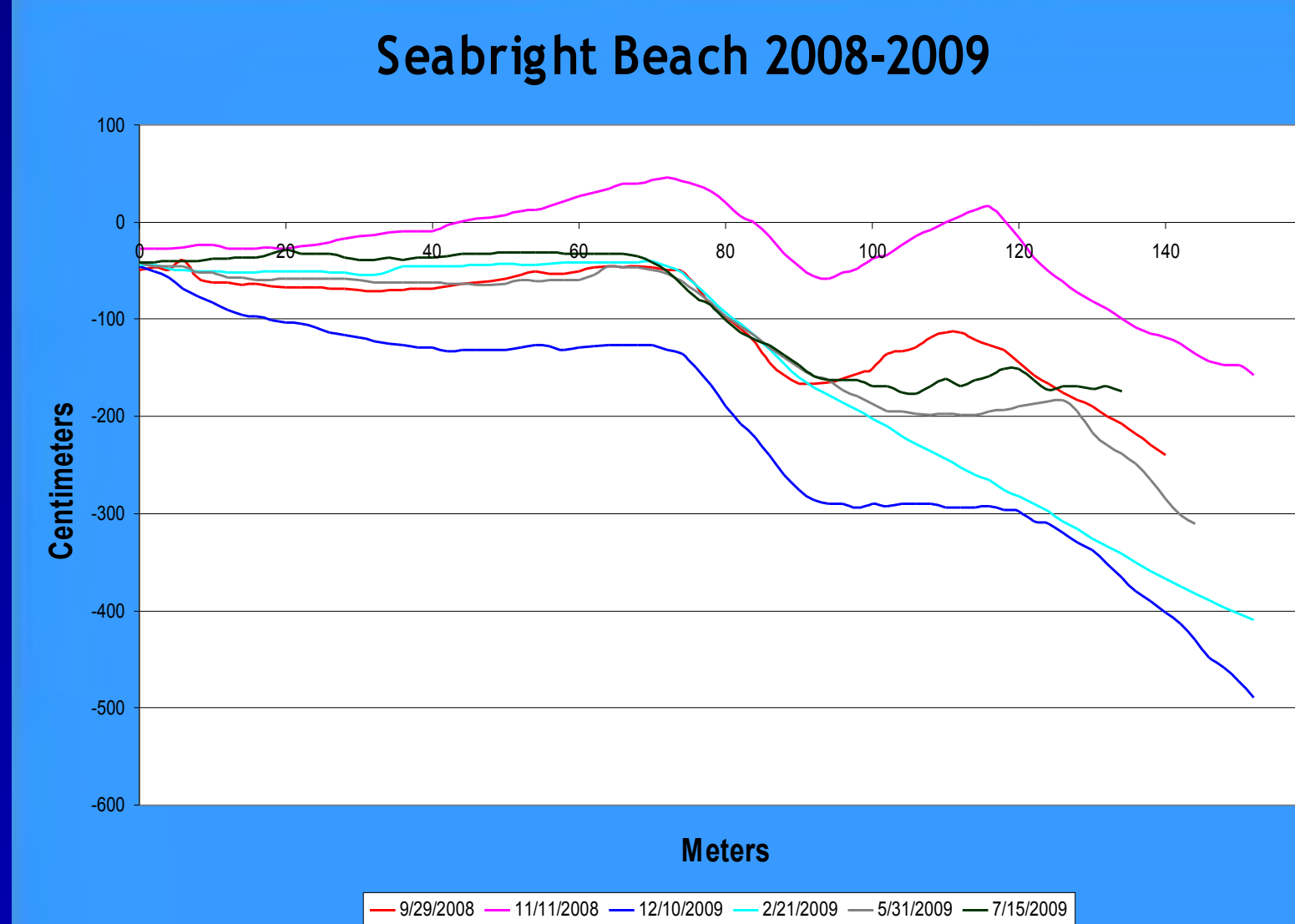
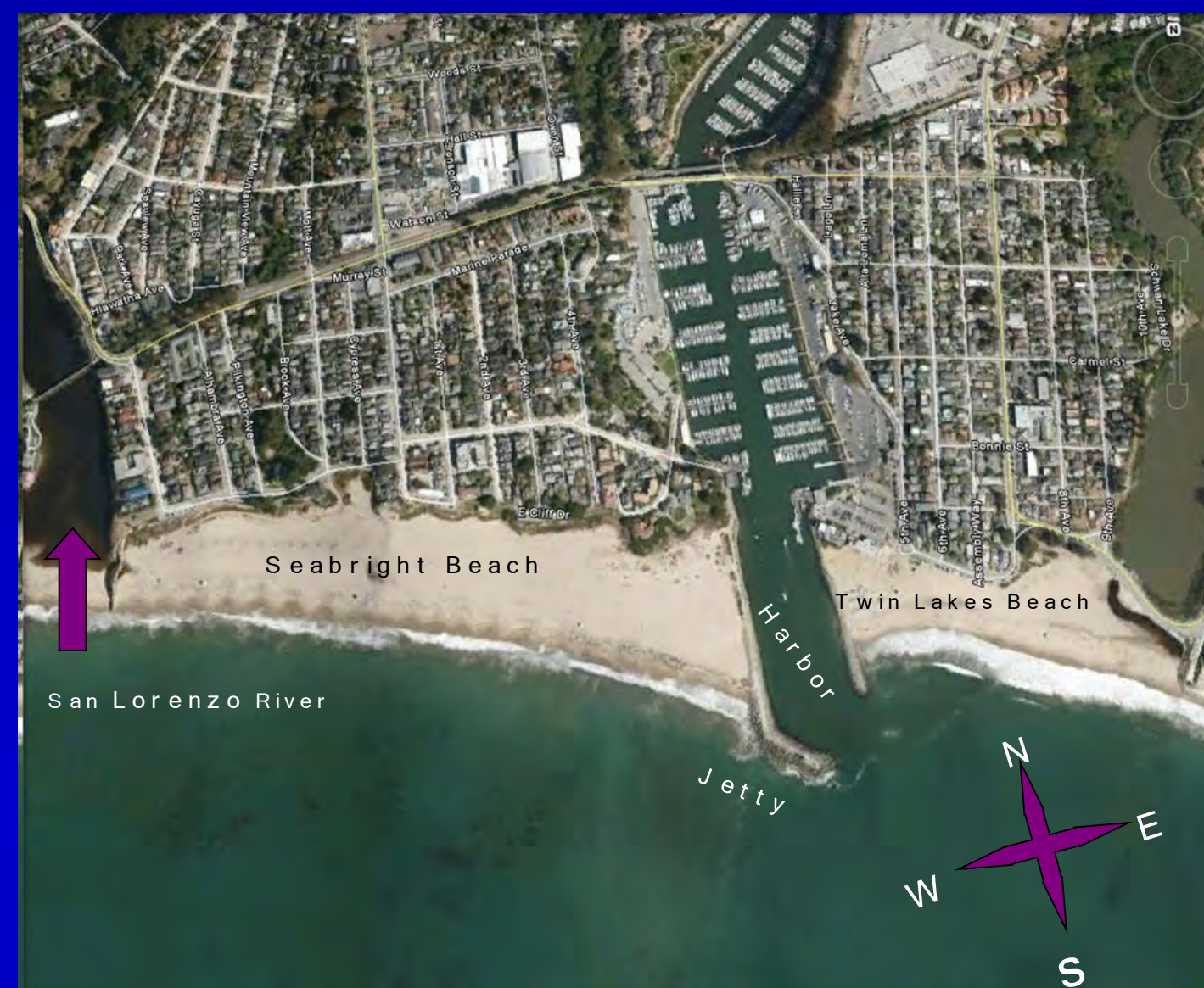
Kelli and Rachel's Excellent Beach Adventure

The Sequel: Sand, Storms, and Sapiens

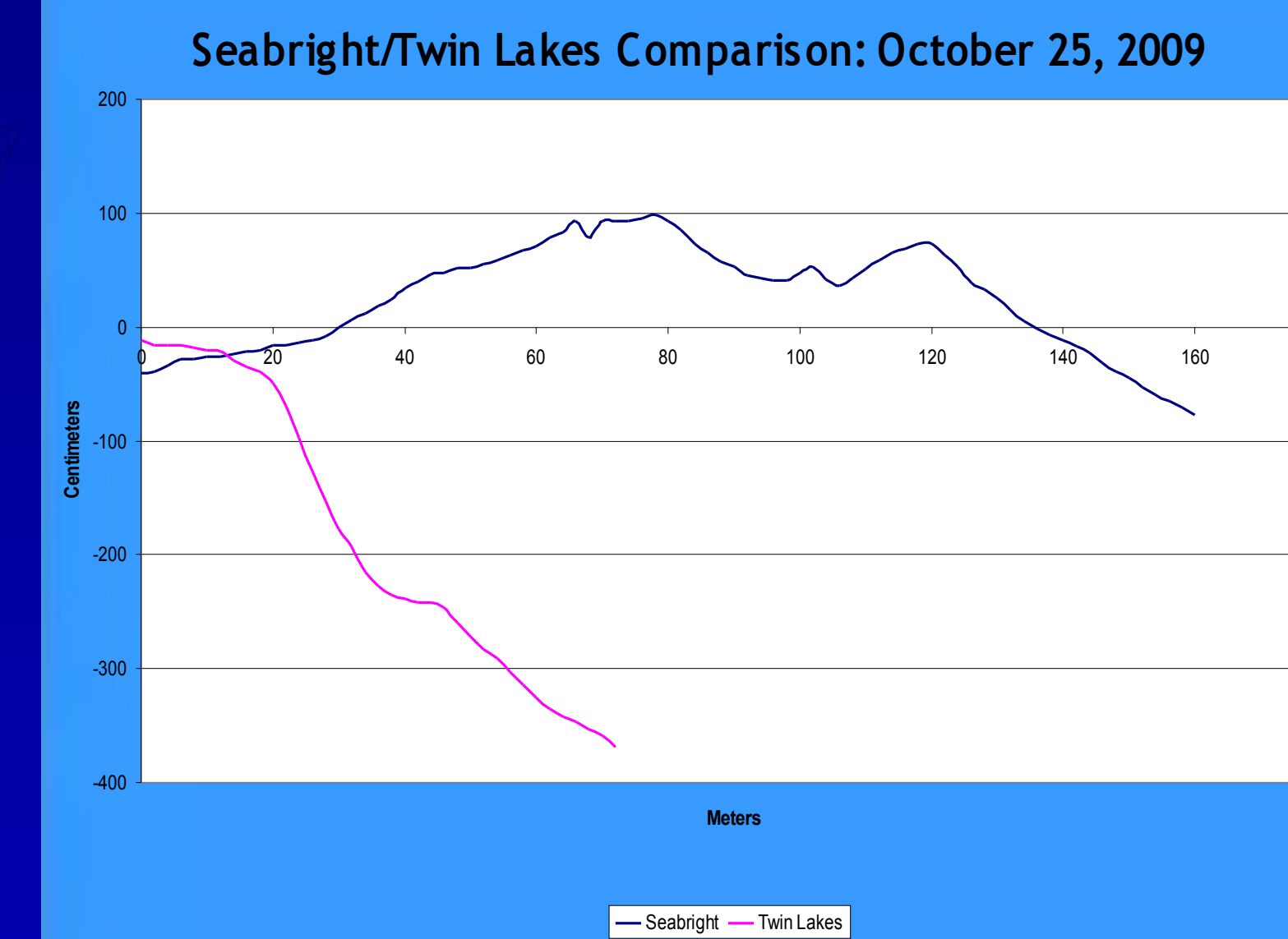


Introduction

Seabright State Beach in Santa Cruz, California has a large sandy shore, created through longshore transport, bordered on the west by the San Lorenzo River, which brings sand to the beach, and on the east by Santa Cruz Harbor and jetty. Further east is Twin Lakes Beach, whose profile is affected by the harbor and the jetty along with dredging. Dredging is a process used to prevent shoaling, which is the build-up of sand at the harbor mouth. Dredging removes sediments from the harbor and transports them back onto Twin Lakes Beach.



Seabright beach was widened in 1964 after the Santa Cruz Harbor Jetty was installed. Above is a picture of Seabright before and after 1964.



Procedure

1. Record time in GMT, wind speed and direction, weather observations, temperature, date, and recent high and low tide in lab book at Seabright Beach in Santa Cruz, CA, then at Twin Lakes Beach in Santa Cruz, CA.
2. Find the eye level of the person who is using the brass 2X hand level.
3. Mark their eye level on the stadia rod with a piece of blue tape.
4. The person using the brass 2X hand level stands on stair next to first vertical bar on right hand side.
5. Hand leveler (person holding stadia rod) stands two meters away, measured with the stadia rod.
6. The person using the rod level uses it to make sure stadia rod is perfectly straight, and they also confirm their position on the line using landmarks at Seabright Beach such as the stairway rail, the sign, and the rooftop. At Twin Lakes Beach, the landmarks are the stop sign and the telephone pole.
7. The person using the brass 2X hand level looks through it. If their current eye level is above their original mark, on the stadia rod, the reading is negative. If their current eye level is below their original mark, the reading is positive. Measure in centimeters.
8. Continue down the beach in a straight line, using landmarks. Measure every two meters until you reach the ocean.
9. Write measurement down in lab book.
10. Cumulate data, and put into graph.

Purpose

The purpose of our study of Seabright State Beach and Twin Lakes Beach in Santa Cruz, California is to determine how the longshore transport and the jetty between the two beaches will impact the profiles of the beaches. Also, we are studying how the annual dredging project in the harbor between the beaches impacts the beaches as a whole.

Hypothesis

We hypothesize that the harbor jetty will block longshore transport past Seabright Beach, thus starving Twin Lakes Beach of sand. Additionally, human dredging of sand from the harbor will counteract some of the sand starvation by adding sand to Twin Lakes Beach.

Materials

- Brass 2X hand level
- Rod level
- Fiberglass metric stadia rod
- Lab book
- Pencil
- Tide book
- Thermometer
- Kestrel
- Compass
- Blue Tape



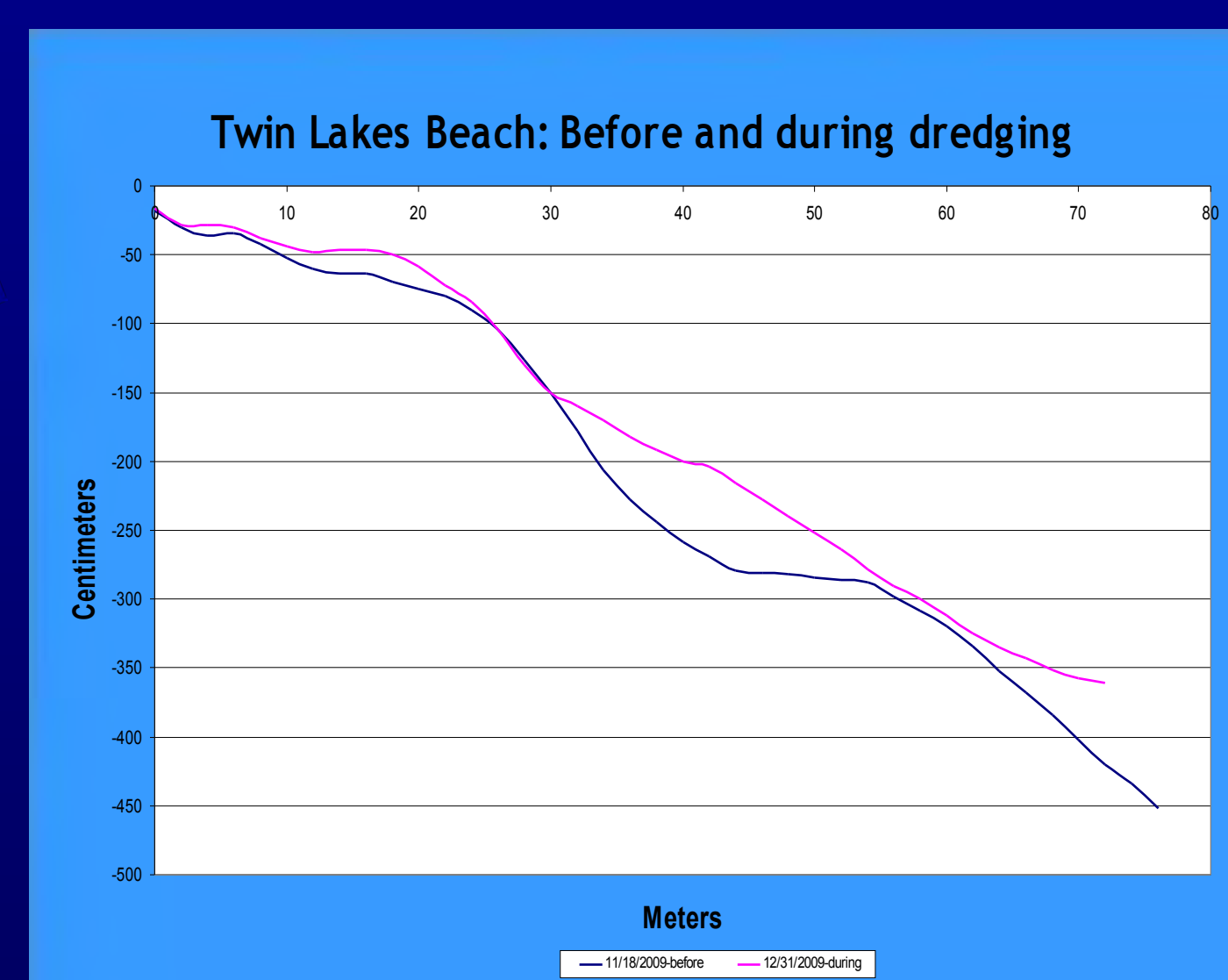
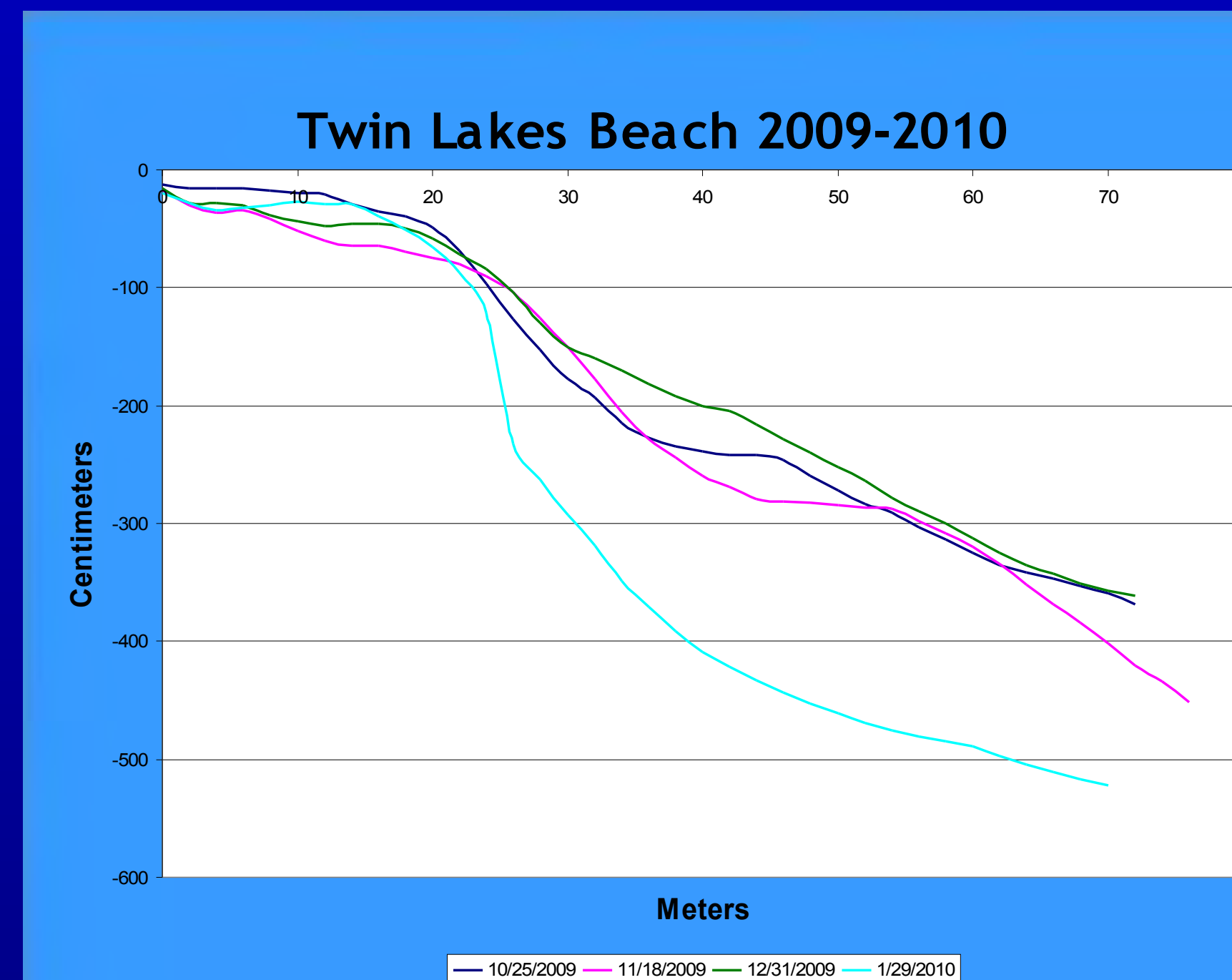
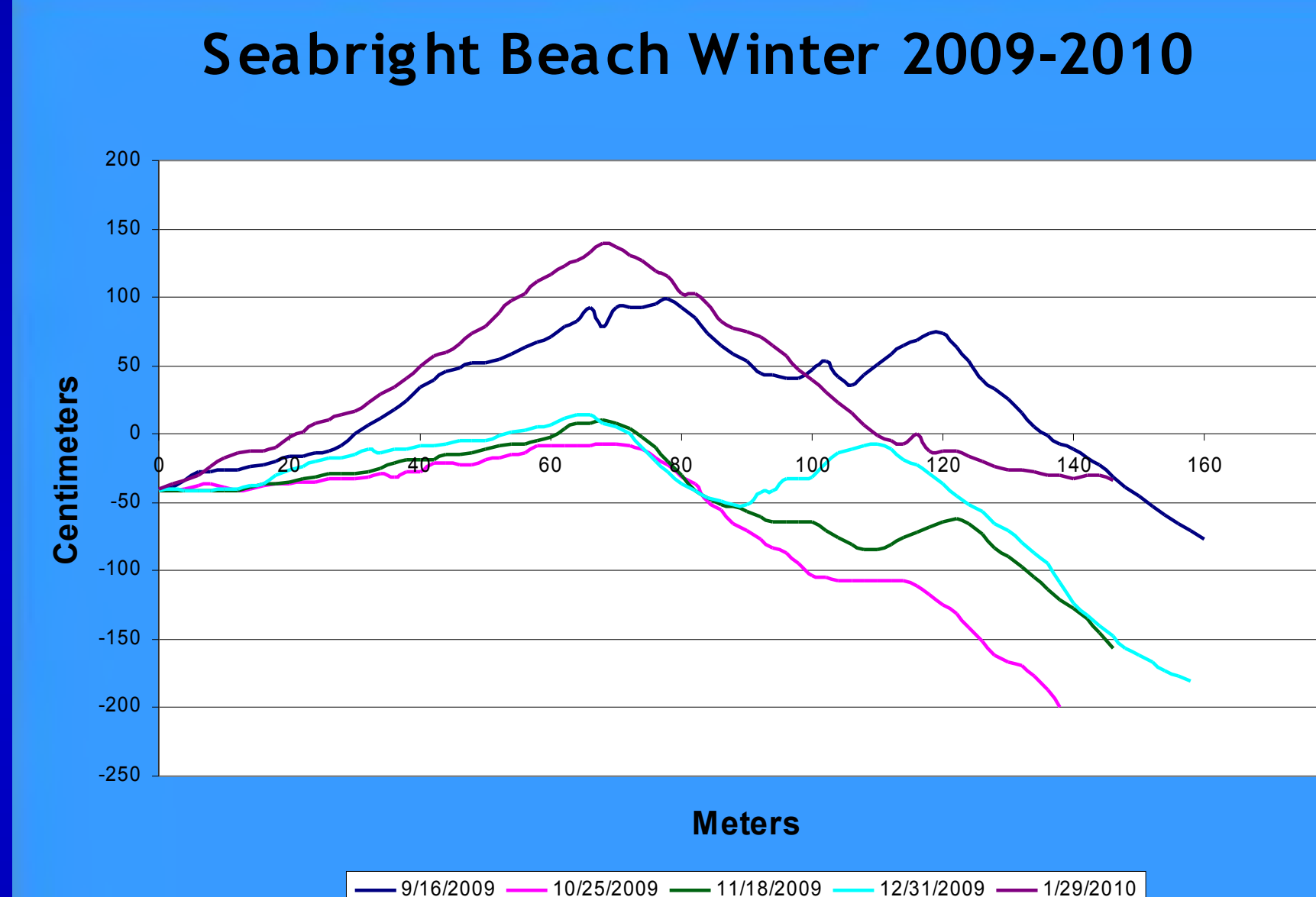
The berm crest on Twin Lakes Beach in January was very large due to the storm we had. The berm crest measured to be up to 10 feet in some locations.



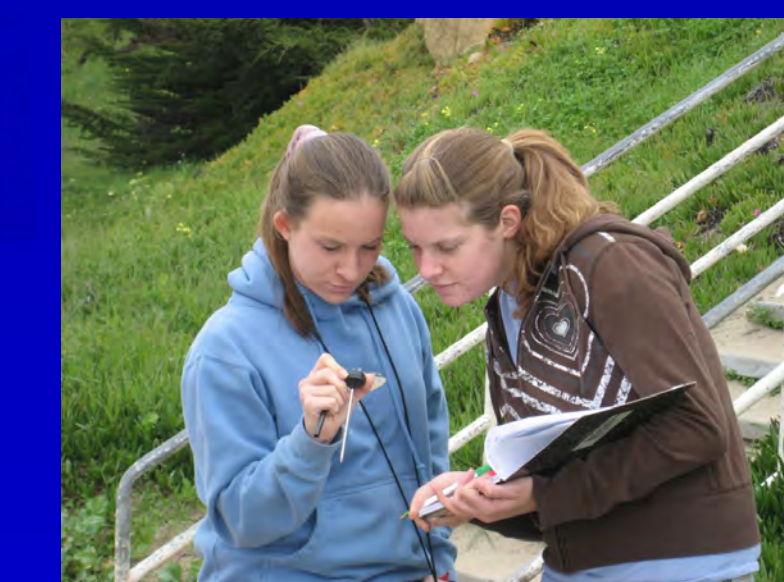
This is the line we follow on Seabright beach every time.



Before the Harbor and jetty were installed in 1964 there were train tracks out on the beach. Now you can only see them when the tide is low.



Kelli Van W andelen
Rachel Bickert
San Lorenzo Valley
High School



Rachel and Kelli recording environmental factors.



This is the line on Twin Lakes Beach that we follow every time.



This is a picture of our starting point at Seabright Beach. We start on the cement stair because it does not move.



Results

Our graphs show that dredging is essential in providing sand to nourish Twin Lakes Beach. Dredging increases the width of Twin Lakes beach because sediment from the harbor is replaced back onto the beach. This is important because Twin Lakes Beach is deprived of sand, and is much smaller than Seabright Beach, because of the blocking of longshore transport by the upstream harbor jetty.

Conclusion

Dredging of the Santa Cruz harbor is essential. If dredging were to stop, there would be negative impacts on many things. Twin Lakes Beach would become much narrower than its current 140 meters across. On the other hand, Seabright Beach would increase in width, because sand and sediment would build up in the harbor mouth (shoaling) and eventually around the jetty and into the harbor, increasing the size of the sandbar and Seabright Beach. The harbor would cease to exist because too much sand would be built up in the mouth and eventually throughout the harbor, stopping boat transportation. This would ultimately result in Twin Lakes Beach losing all sand and ceasing to exist. The houses on Twin Lakes Beach would lose their properly value of being beach-side homes, and would possibly be destroyed by reoccurring wave action. Also, the economy of Santa Cruz is highly dependent on the summer tourism. If these beaches were to be destroyed, fewer tourists would come to Santa Cruz, which would hurt the economy. As long as the harbor is in use, dredging is necessary to maintain it, the health of the beaches, and the city of Santa Cruz.

Acknowledgements

We would first like to thank our wonderful mentor, Dave Schwartz of Cabrillo College, for all of the insight, knowledge, and assistance he provided us with. This project would not be complete without his help. We would also like to thank our teacher from San Lorenzo Valley High School, Jane Orbuch. Ms. Orbuch supported us throughout this whole project, and was always there for any questions we might have had. We are very grateful to her for that. Finally, we would like to thank our wonderful parents, who supported us as well, and were also our chauffeurs. Thank you to everyone else who contributed to this project. We appreciate all of your assistance and support.

